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# ECODESIGN – HOW TO UNFOLD THE POTENTIAL SYNERGY BETWEEN THE EUP, WEEE AND ROHS DIRECTIVES

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**Abstract:** The amount, complexity and variety of products introduced to the European market are increasing and products are more than ever traded globally. This development challenges the approach to regulate and stimulate the innovation of cleaner products. The EU has responded by introducing Integrated Product Policy (IPP). The approach aims at promoting measures to reduce the environmental impacts of products. Since the IPP approach was introduced around 2000, several instruments have been implemented; the RoHS, WEEE and the EuP Directive as well as the European ecolabel and the Energy labelling Directive. The focus of this paper is the potential synergy between the three normative, so-called eco-design directives, and to what extent the EU has accomplished to integrate eco-design in the different directives and voluntary instruments.

## 1. INTRODUCTION

Today more than ever we have electronic products everywhere in our households. The quantity is increasing; and it is common to have a TV not only in the living room, but also in the bedroom, the kitchen and even in the children's rooms. According to the Danish Energy Agency the number of TVs in Danish households has grown from around 2.2 million in 1980 to 5.5 million in 2008 [1]. That equals a growth from approximately 1 TV per household in 1980 to around one per person in 2008. Also the variety of products is increasing; on the ICT side we see families with TV, DVD player, Xbox, Play Station or Wii, PC, laptop, fixed line phone, several mobile phones and the list could go on. With this amount of products the environmental impact of a hold cannot be traced back to one or two major contributors or products but it is spread out on many different products.

The products are also getting more complex both in terms of their function and the technique inside the product, but also in terms of their product chain and the stakeholders involved in the products' life time. A product might be sold in Denmark, but it is produced in South Korea with suppliers and sub-suppliers from China, Malaysia and Singapore delivering parts to the final product. Once the product is broken or the consumer simply finds it out of fashion it is thrown out – hopefully in a way so it can be disassembled, materials reused and toxic substances destroyed properly. Unfortunately, it is

seen that loads of old ICT equipment end up in scrap yards in India or Africa, where they are disassembled in a way being a danger both to the environment and the health of people.

### 1.1. Integrated Product Policy

This development has challenged the approach to regulate and stimulate the innovation of cleaner products. EU has responded to this development by introducing the Integrated Product Policy (IPP). IPP was developed in cooperation between the Commission and stakeholders and was first discussed in 1998 [2]. IPP is based on several key principles, first of all Life Cycle that means considering the entire product life cycle from the extraction of raw materials, production, transport, use, recycling and disposal. This aims at considering both the cumulative environmental impacts and avoiding burden shifting, where environmental impacts in a single life cycle phases are addressed with the result of increasing the environmental impact in another life cycle phase. IPP is an integrated approach aiming at promoting measures to reduce the environmental impact of products at a point where this is most effective [2]. This approach could also be called ecodesign.

Further key principles of IPP are “working with the market”, “stakeholder involvement”, “continuous improvement” and “a variety of policy instruments”. [2]

### 1.2 IPP Instruments

Since the introduction of IPP several legislations implementing the approach have appeared. Especially the following five are relevant in this context:

- Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
- Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)
- Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products (EuP)
- Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel
- Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products

Each of the regulations have implemented IPP in their own way. The hypothesis in this paper is that the potential synergy between the ecodesign directives and the energy and ecolabels is not utilized and hence the implementation of ecodesign in the EuP Directive is not successful.

The synergy between EU's IPP regulations is analysed in this paper with the aim of investigating to what extent ecodesign is implemented in the different directives. First, an in depth analysis of the EuP Directive and its potential to implement ecodesign is presented. Thereafter, analyses on how ecodesign is implemented in the RoHS and WEEE Directives are presented. Analyses of EU's ecolabel and the forthcoming energy label are presented and finally the synergy between the two types of IPP instruments is analysed. Throughout the paper the requirements for televisions will be used to exemplify.

## 2. RESULTS

### 2.1 The EuP Directive

The EuP Directive establishes a framework for setting ecodesign requirements for energy using and energy related products. The ecodesign requirements are set up in implementing measures (IM). The objective of the Directive is to ensure free movement on the market of products in compliance with the

ecodesign requirements and “*it contributes to sustainable development by increasing energy efficiency and the level of protection of the environment, while at the same time increasing the security of the energy supply*” [3].

The implementation of the Directive indicates that focus in the IM is towards only setting requirements for the energy consumption and energy efficiency. The argument for focusing solely on power consumption is presented in the comments to the Regulation. It is argued that environmental impacts related to hazardous substances in the TVs and waste from disposed TVs are addressed in the RoHS and WEEE Directive, respectively. In Table 1 the focus areas of the nine IM that have been adopted so far are listed. It is clear that focus is not on an integrated thinking as the concept of ecodesign and IPP is all about. The EuP Directive does however have the potential to implement ecodesign, if not only the area with THE most important environmental impact is addressed and if more generic requirements are set up.

### 2.2 The RoHS Directive

The RoHS Directive restricts the use of certain chemical substances in electronic and electrical equipment. The restriction concerns cadmium, lead, mercury, hexavalent chromium, poly-brominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE), in quantities exceeding maximum concentration values. While there is no direct formulation on ecodesign, the aim of the Directive is in this way “*to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment*” [4]. If electrical and electronic products do not comply with the regulation the products are prohibited from being sold on the EU market [5].

According to the Commission the RoHS Directive has prevented several thousand tonnes of the prohibited substances from being placed in the products. Furthermore, design practices in this regard have changed also in countries outside the EU. However, compliance checks in EU member states have revealed that up to 44% of the EEE that was checked for compliance does still not comply with the Directive. [6]

### 2.3 The WEEE Directive

The WEEE Directive sets marking requirements to producers and importers and aims to establish an individual producer responsibility for the take back and treatment of WEEE. The latter makes the producer economically responsible for the take back and environmentally friendly treatment of WEEE.

The producer can comply with this regulation individually or by joining collective schemes. The WEEE directive also sets requirements as to the recovery rates of the products in scope. The purpose of the WEEE Directive is, *“as a first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment”* [7].

The idea behind the regulation is that by making the producer responsible for the end of life phase of their products, gives economic incentives for the producer to integrate considerations about the product's end of life phase and recycling options in the design phase. In Article 4 of the Directive it says: *“Member States shall encourage the design and production of electrical and electronic equipment which take into account and facilitate dismantling and recovery, in particular the reuse and recycling of WEEE, their components and materials.”* [7]

A recent study has revealed that only seven member states have fully implemented the individual producer responsibility and seven member states have ignored the implementation of the individual producer responsibility completely [8]. In the latter countries the producers can join collective schemes, where they are not financially responsible for the take back of exactly their products, but the payments are based on averages. In these member states the incentives for ecodesign have diminished significantly, and it is questionable whether the WEEE Directive serves its purpose on ecodesign at all.

## 2.4 The Flower

The Flower is the European ecolabel established in 1992. A large range of products can be awarded the ecolabel from campsite services to paint and refrigerators. In this paper the requirements for TVs are investigated further.

The latest Commission Decision on establishing the revised ecological criteria for the award of the Community Ecolabel to TVs was published in March 2009 and focuses on the following areas [9]:

- Power consumption in on-mode
- Power consumption in standby
- Maximum energy consumption
- Dismantling

- Life-time extension
- Chemicals in products
- Information requirements

From the above list it is clear that the Flower expands the focus of requirements compared to the EuP Directive. Besides setting criteria to the energy consumption in the use phase, criteria are set to other life cycle stages and other types of environmental impacts.

Since the introduction of the label the number of labelled products and services has grown steadily. In the beginning of 2010 1064 licences were awarded, 6 of these to TVs. [10]

## 2.5 The Energy Labelling Directive

The first energy labelling Directive was adopted in 1992. The Directive sets a framework for mandatory energy labelling requirements for household appliances, such as refrigerators and washing machines. In 2010 a revision of the Directive was adopted which includes energy related products in the scope [11].

As in the EuP Directive the requirements of the Energy Labelling Directive are set up in IM. To exemplify the IM for TVs is used. The following analysis is of the latest working document put forward in February 2010 [12].

The labelling requirements proposed are that televisions placed on the European market must be supplied with a label with the following information:

1. the energy efficiency class
2. the on-mode power consumption and the annual on-mode energy consumption
3. the screen size in diagonal

Obviously, the label focuses only on energy efficiency, and quite in line with the EuP Directive. The intention is that the criteria for labelling shall be gradually tightened, meaning that for the label applicable 12 months after the publication of the IM the most energy efficient label possible to obtain is A. From 2013 it will be possible to obtain the label A+ and the F will be the least efficient label. In 2016 A++ will be the most efficient label and E will be the least efficient label. Finally in 2019 the most efficient label is A+++ and E will be the least efficient label. [12]

In Figure 1 the requirements to on-mode power consumption of the EuP Directive, the Flower and the Energy labelling Directive is illustrated. As the Energy labelling Directive works with an energy

efficiency index which is divided in intervals, the lines in Figure 1 represent the maximum power consumption the products must have in order to obtain the given label. As an example, in order for the product to obtain the energy efficiency label A+ the product must have a power consumption that is between the A+ line and the A++ line.

### 3.6 The Synergy between IPP Instruments

Two results can be concluded from the above;

- The synergy between the different IPP instruments can be improved
- The synergy between the EuP, WEEE and RoHS Directives can be improved.

Five IPP instruments are presented above. Four of the instruments are mandatory, that is the EuP, RoHS, WEEE and Energy labelling Directives and the Flower ecolabel is voluntary, but where the first three set minimum requirements that expels the worst performing products from the market, the Energy labelling Directive aims at giving the producers incentives to produce better performing products. The Ecolabelling Directive also aims at creating incentives for producers to produce better performing products, but on a voluntary basis.

In Figure 2 the aim of the different IPP instruments is illustrated. RoHS and EuP directives set minimum standards for products' environmental performance, thereby removing the worst performing products from the market. In the other end of the scale, ecolabels set voluntary criteria with the aim that only the best performing products on the market can fulfil. The ecolabels are continuously updated and tightened to ensure that at any time only the best performing products can fulfil the criteria. In this way the ecolabels can generate changes in the market that can create a pull towards more environmentally friendly products.

It is recognized that the directives and the ecolabels are two different approaches to IPP, cf. Figure 2. However, as the IM of the EuP Directive have not accomplished to set comprehensive requirements in terms of fulfilling the aim of ecodesign, it is clear that the obvious link between the ecolabel and the IM have not been utilized.

Many years of work and experience is behind the ecolabels with setting environmental criteria for products and the hot spots of a products environmental performance are the background for these criteria. By creating a common information platform between the several instruments this knowledge could have been utilized and have led to a

faster and more comprehensive implementation of the EuP Directive by including more environmental impacts categories in the scope of the IM and in tightening the requirements in the IM. This type of synergy is visible when considering the proposal for IM of the Energy labelling Directive. The energy efficient index determining the label applied to TV fits for some of the categories to both the Flower and the IM of the EuP Directive.

### 2.7 The Synergy between EuP, WEEE and RoHS Directives

It is a balance on the one hand to develop regulations that regulate the environmental impacts of products in a life cycle perspective and on the other side not create inexpedient double regulation that confuses producers, consumers and regulators. However, the objective of the EuP Directive can not be fulfilled without looking at the entire product life cycle and setting requirements to several environmental impact categories.

Especially, the WEEE Directive does not fully fulfil its objective of ecodesign, and it is possible to set specific requirements on design for recycling, material use, etc. as part of the EuP IM without conflicting with the WEEE Directive (since WEEE does not set such requirements). The RoHS Directive has to some degree fulfilled its objectives, but improvements can be made. Chemical requirements in the EuP IM could be an information obligation on the product's content of Substances of Very High Concern (SVHC) of the candidate list in the REACH Regulation.

As the existing regulation only to a limited degree fulfil their objectives on ecodesign, the EuP directive could without compromising other regulations encompass requirements on the environmental impact of the entire life cycle of the products. It is likely that requirements in three different directives creates confusion and lack of coherency – and one way to avoid “double regulation” is obviously to gather directives with the same overall objective – ecodesign – in a common Directive. In spite of our criticism of the current processes and content of the IM, then the EuP directive is significantly more on the right track and is more dynamic than what can be said related to ROHS (that just has been recast without significant changes) and WEEE that fails on the ecodesign dimension. Besides, a further benefit is that it will create clarity among regulators, producers and consumers, and the manufacturers will only have one “door” to consider – in long run the generic requirements of the EuP Directive could be a

guidebook on ecodesign and on how enterprises can develop cleaner products.

### 3. DISCUSSION

The EuP Directive has not achieved to implement ecodesign in the IM as the main focus is on energy consumption in the use phase. Taking the two other IPP directives into consideration, the RoHS and WEEE Directive, the picture does not change much. Looking at the criteria for TVs of the European ecolabel, the Flower, more environmental aspects are included and the criteria set up for on-mode power consumption are stricter. Therefore two conclusions can be drawn:

1. It is time to create a synergy between the IPP directives and the European ecolabels and thereby utilize the knowledge that

already exist on environmental hotspots for the different products groups. For instance by introducing a common information platform. A further benefit besides knowledge and experience sharing is that a common information platform will reduce the preparation time necessary when developing new requirements.

2. The solution to integrating ecodesign better could be to convert the EuP Directive into THE ONE ecodesign directive as it was the intension from the beginning. This means including more environmental aspects and life cycle phases into the requirements instead of in the directive to refer to other directives that do not include the issue after all.

Table 1: Focus area of the nine adopted IM of the EuP Directive [13, 14, 15, 16, 17, 18, 19, 20, 21]

	Entry into force	Adopted	Power consumption	Energy efficiency	Lamp efficacy	Performance	Motor efficiency	Information requirements
<b>Television</b>	12.08.09	22.07.09						
<b>Standby and off-mode losses</b>	07.01.09	17.12.08						
<b>Battery chargers and external power supplies</b>	27.04.09	07.04.09						
<b>Tertiary lighting</b>	13.04.09	18.03.09						
<b>Simple set-top boxes</b>	25.02.09	04.02.09						
<b>Domestic lighting</b>	18.03.09	14.04.09						
<b>Electric motors</b>	12.08.09	22.07.09						
<b>Circulators</b>	12.08.09	22.07.09						
<b>Domestic refrigeration</b>	12.08.09	22.07.09						

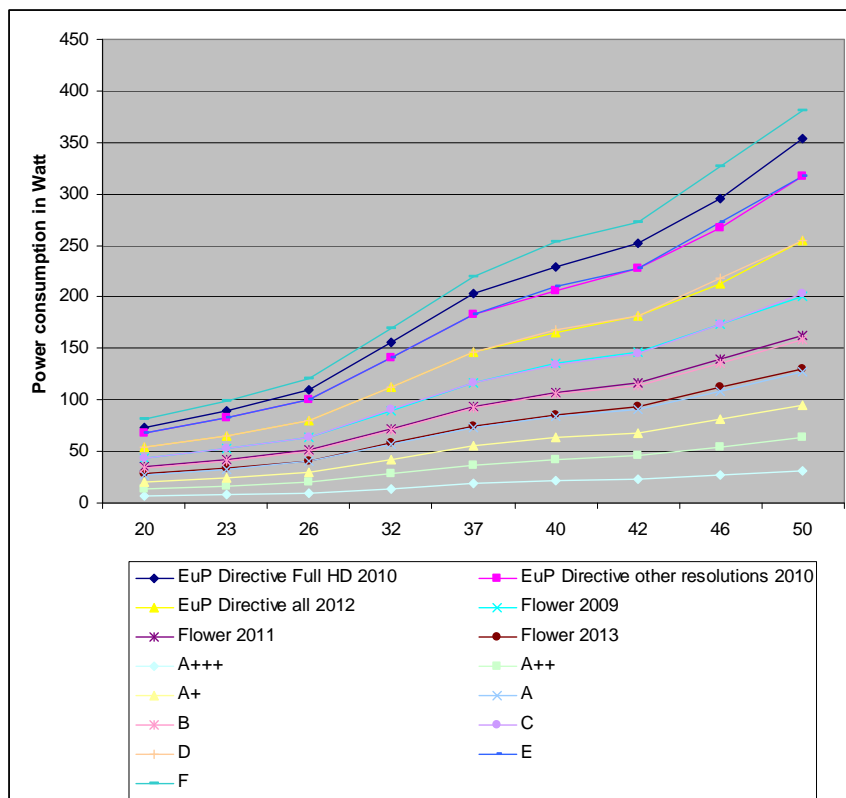


Figure 1: On-mode power consumption requirements of the IM of the EuP Directive, the Flower ecolabel and the forthcoming energy label for TVs.

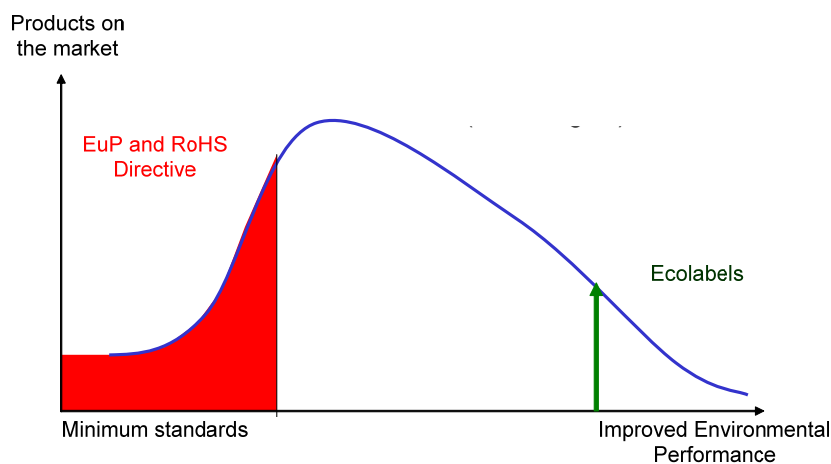


Figure 2: The scope of the EuP and RoHS Directives compared to the scope of the Ecolabels

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